

Calculus Homework 1-4

$$1. \quad \frac{dy}{dx} = \frac{4t^3 + 4t - 8}{3t^2 - 2t} \quad 3t^2 - 2t = 0$$

$$t(3t - 2) = 0$$

$$t = 0 \quad t = \frac{2}{3}$$

at $t = 0$ and $t = \frac{2}{3}$

oops \therefore No Answer Sorry

$$2. \quad \int_0^4 \sqrt{(2t)^2 + (1)^2} = \int_0^4 \sqrt{4t^2 + 1} \quad \underline{\underline{D}}$$

$$3. \quad a(t) = 2$$

$$v = \int 2 = 2t + C \quad v(0) = 0 \quad \text{so } C = 0$$

$$v = 2t$$

$$\text{position}_x = \frac{2t^2}{2} + C \quad x = t^2 + C \quad t = 0 \quad x = \pi$$

$$x = t^2 + \pi$$

$$\text{position vector } \langle t^2 + \pi, \cos(t^2 + \pi) \rangle$$

$$v = \langle 2t, -2t \sin(t^2 + \pi) \rangle$$

$$\text{at } (4, \cos 4)$$

$$4 = t^2 + \pi$$

$$4 - \pi = t^2$$

$$\sqrt{4 - \pi} = t$$

must find t
when $t^2 + \pi = 4$

$$\text{speed: } \sqrt{(2t)^2 + (-2t \sin(t^2 + \pi))^2} \text{ with } t = \sqrt{4 - \pi} = \underline{\underline{2.324}}$$

$$4. \quad x = t - 2 \quad y = (t - 2)^2 \quad A \quad v = \langle 1, 2(t - 2) \rangle$$

$$x = \frac{3}{2}t - 4 \quad y = \frac{3}{2}t - 2 \quad B \quad v = \langle \frac{3}{2}, \frac{3}{2} \rangle$$

$$b) \quad d = \int_0^3 \sqrt{1 + (2t - 4)^2} dt = 6.126$$

$$c) \quad t-2 = \frac{3}{2}t-4$$

$$2 = \frac{1}{2}t$$

$$4 = t$$

$$(t-2)^2 = \frac{3}{2}t-2$$

$$t^2-4t+4 = \frac{3}{2}t-2$$

$$t^2 - \frac{11}{2}t + 6 = 0$$

$$2t^2 - 11t + 12 = 0$$

$$(t-4)(2t-3) = 0$$

$$t=4 \text{ and } t=3/2$$

$x \neq y$ will meet at $t=4$
